MICROBIAN : Microbial diversity in the Sør Rondane Mountains in a context of climate change

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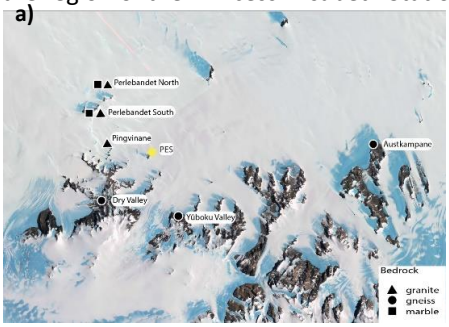
The Sør Rondane Mountains (SRM) represent a c. 900 km² large mountain range, encompassing a large range of terrestrial habitats differing in geology and soil characteristics, exposure time and microclimatic conditions. The objectives of the BelSPO project MICROBIAN are fourfold:

1) Use a combination of **remote sensing (Digital Elevation Model) and close-range field observation** techniques to map physical habitat characteristics and the presence/extent of biological crust communities in the region of the Princess Elisabeth Station (PEA)



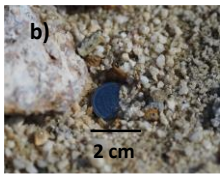


Fig. 1 a) Satellite image of the western Sør Rondane Mountain region with the sampled sites. Symbols represent the bedrock type. **b)** Temperature and humidity data loggers placed in more than 40 sites to validate satellite data acquisition.

2) Generate a comprehensive inventory of the taxonomic and functional diversity of microbial communities in these habitats by amplicon sequencing

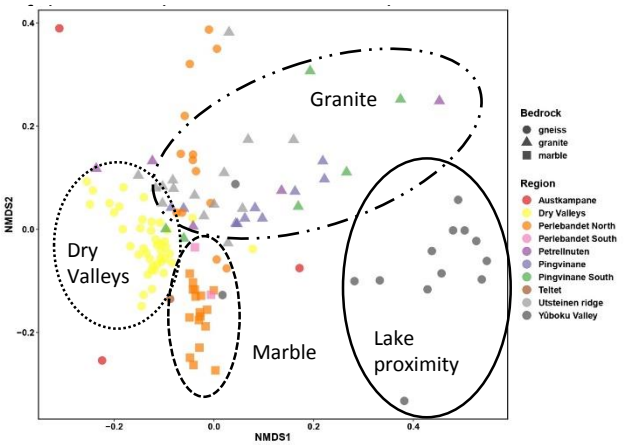


Fig. 2 nMDS plot of 129 sequenced samples based on Hellinger transformed OTU abundance data issued from an Illumina MiSeq sequencing targeting the V1-V3 of the **16S rRNA gene** evenly subsampled to 1000 reads. Colors represent the different sampled regions and shapes define the bedrock types.

3) Use **mesocosm field experiments** (Open Top Chambers and snow fences) to mimic the possible effects of future climate change on the taxonomic diversity of these microbial ecosystems

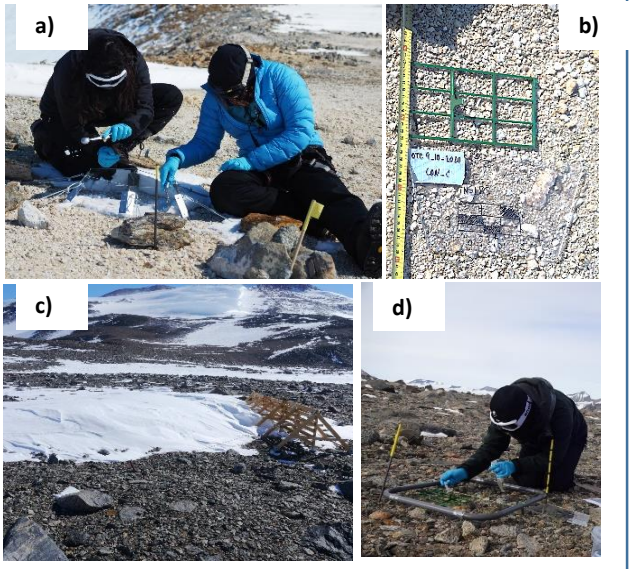


Fig. 3 Open Top Chamber sampling **(a)** with scheme of control plot sampling **(b)**. Snow fence with snow accumulation and control plot sampling .

4) Conduct **field experiments to inform policy-makers in view of decision making regarding environmental protection and prevention measures** to reduce the introduction and spread of non-native species and to avoid cross-contamination between sites.

Fig. 4 Contamination experiment conducted on knees **(a)** and boots **(b)**.

The proposed research will provide a proof of concept to use high resolution satellite images for identifying regions of particular biological interest in East Antarctica and more broadly, will make a significant contribution to understanding Antarctic terrestrial microbial ecology.